

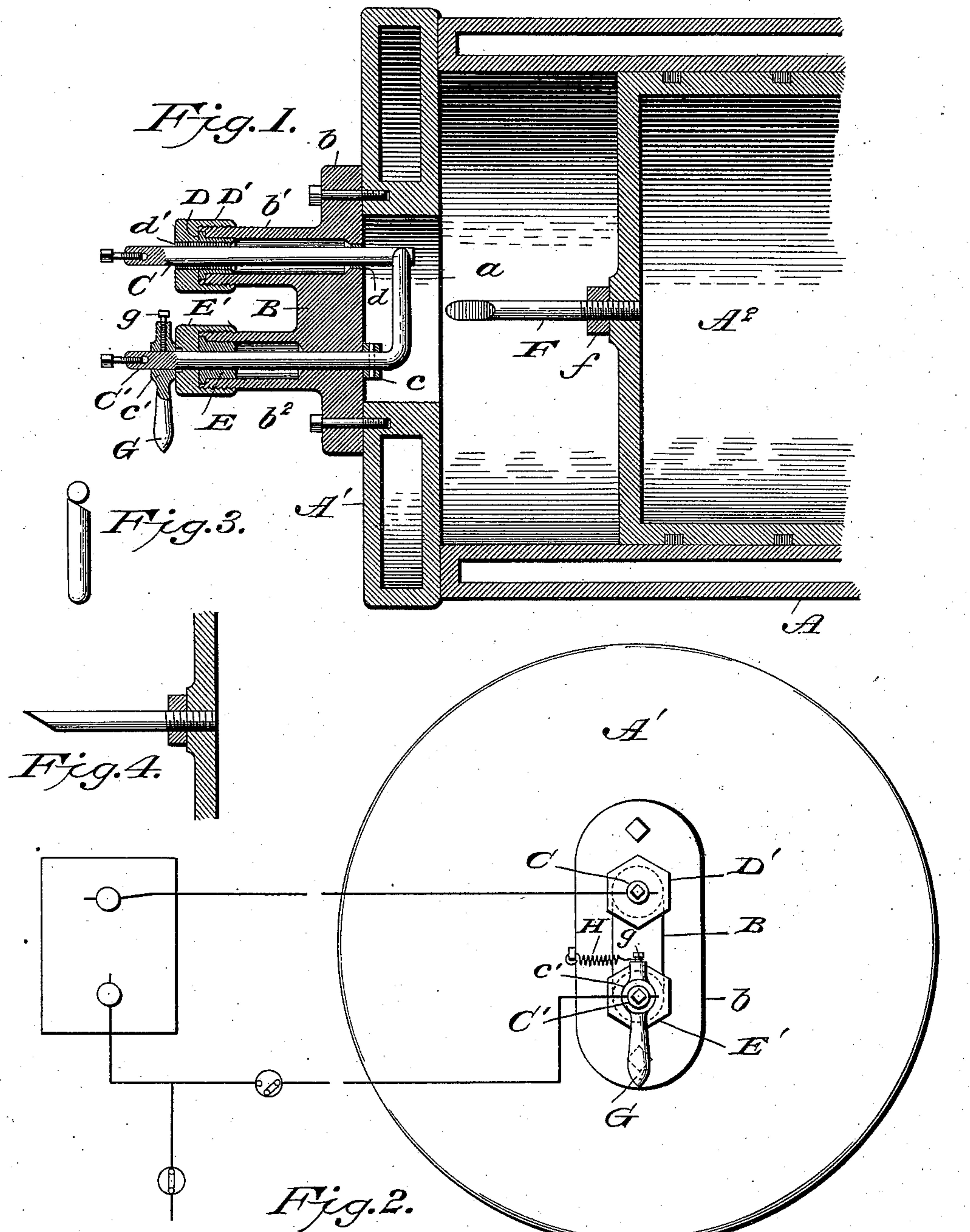
(No Model.)

2 Sheets—Sheet 1.

W. F. DAVIS.  
ELECTRIC IGNITER FOR EXPLOSIVE ENGINES.

No. 577,158.

Patented Feb. 16, 1897.



WITNESSES  
*L. S. Elliott.*  
*M. Johnson*

*William F. Davis*  
INVENTOR  
by *[Signature]* Attorney

(No Model.)

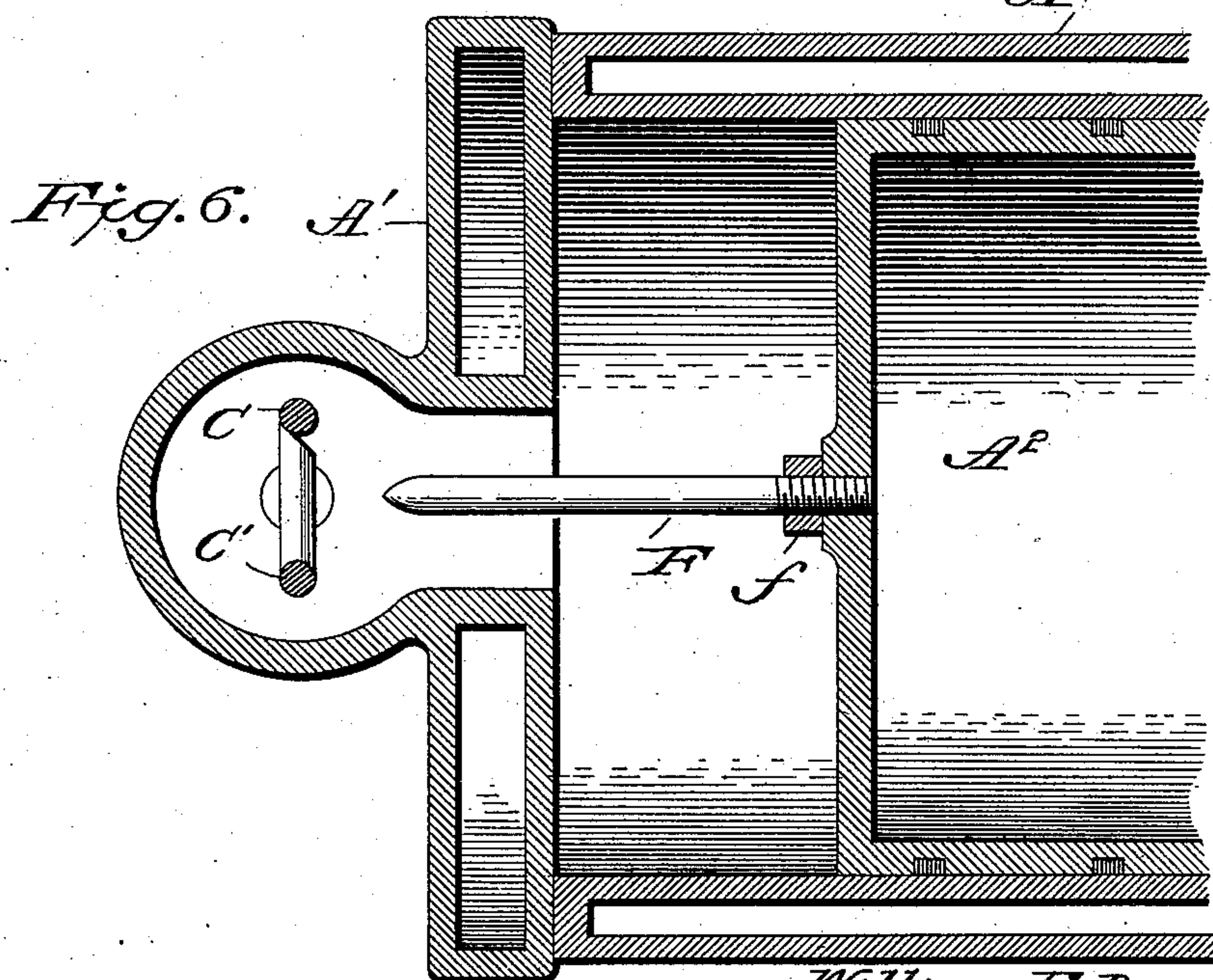
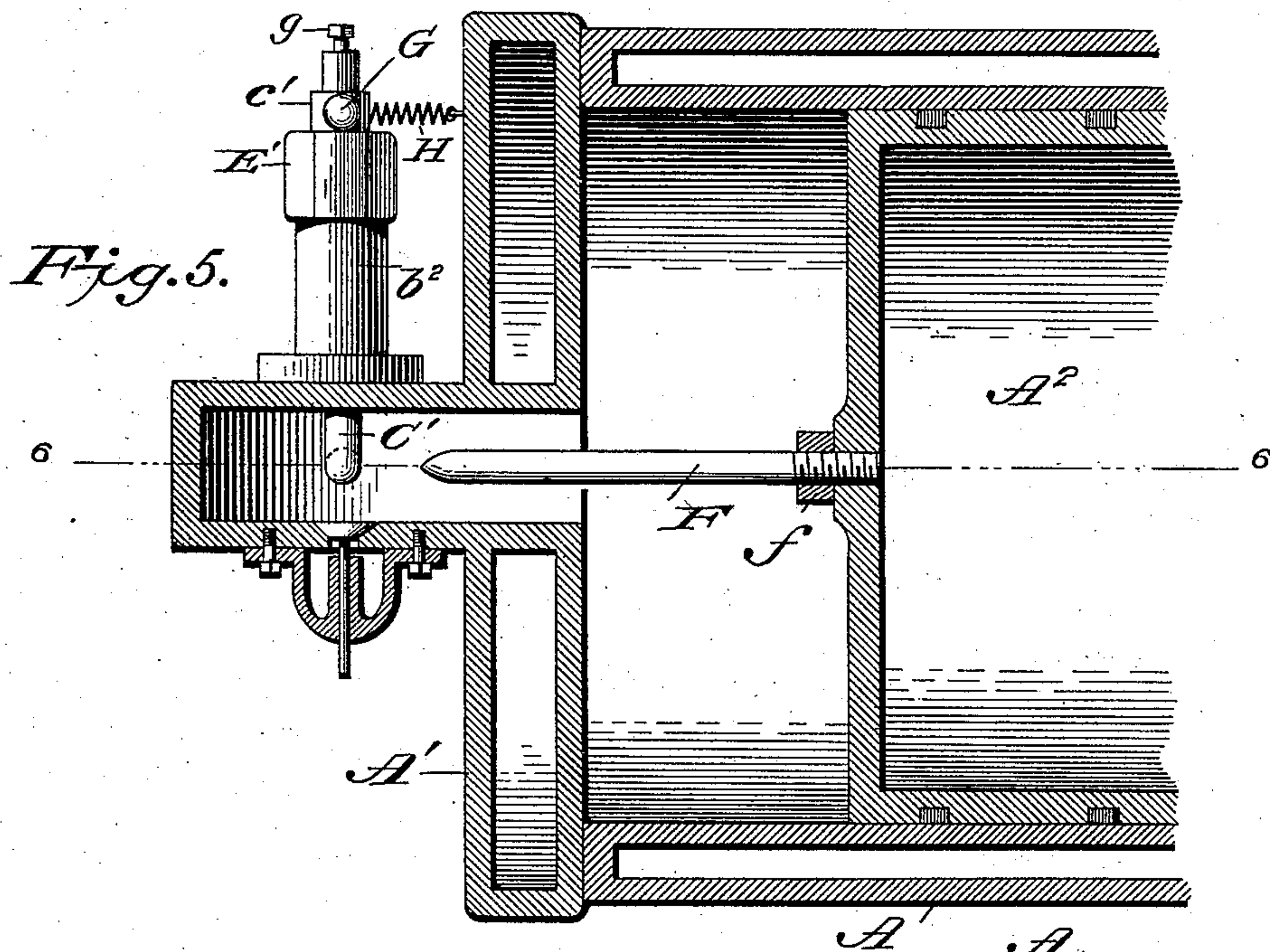
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Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM F. DAVIS, OF WATERLOO, IOWA, ASSIGNOR TO THE DAVIS  
GASOLINE ENGINE COMPANY, OF SAME PLACE.

## ELECTRIC IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 577,158, dated February 16, 1897.

Application filed September 24, 1896. Serial No. 606,875. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM F. DAVIS, a citizen of the United States of America, residing at Waterloo, in the county of Black Hawk and State of Iowa, have invented certain new and useful Improvements in Electric Igniters for Explosive-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in electric igniters for explosive-engines, and has for its object to provide a simple, cheap, and effective device that can be readily applied to an engine, the particular construction of the parts insuring the production of a spark at each reciprocation of the piston, and also provides for manually operating the working electrode in the same manner as is accomplished by the piston.

With the above ends in view the invention consists in the particular construction and combination of the parts to present a stationary electrode insulated from the supporting-frame, and a working electrode comprising a rock-bar having a bent end with beveled terminal which engages the stationary electrode, the working electrode being held normally in contact with the stationary electrode by a spring and operated against the action of said spring to break the circuit and cause a spark either by the hand-lever connected thereto or by a projection on the piston which contacts with the bent end thereof, as hereinafter fully set forth and particularly claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a longitudinal sectional view through the cylinder of an explosive-engine, showing my electric igniter applied. Fig. 2 is a plan view of Fig. 1 with a diagram of the electric connections. Fig. 3 is a detail view illustrating the contact-points of the electrodes. Fig. 4 is a detail view of the operating-arm carried by the piston. Fig. 5 is a sectional view of a modification of the invention, the electrodes being positioned vertically or parallel with the head

of the cylinder in contradistinction to the position shown in Fig. 1. Fig. 6 is a sectional view on the line 6 6 of Fig. 5.

A designates the cylinder of an explosive-engine, and A' the head thereof, the latter being provided with a central opening *a*, covered by a frame or casting B, which supports my improved electric igniting device. The cylinder and cylinder-head are of ordinary construction and provided with water-spaces, as shown, the cylinder containing a piston A<sup>2</sup>, which is adapted to reciprocate therein, and is connected in the usual manner to a crank-shaft. (Not shown.)

The frame or casting B is shaped to present a base *b*, having integral projections forming housings *b'* and *b*<sup>2</sup>, which support the electrodes hereinafter described, the base being apertured to receive bolts or screws which enter the cylinder-head and secure the frame or casting thereto.

C designates the stationary electrode, which consists of a bar of steel or other suitable metal positioned centrally within the housing *b'* to leave a space surrounding said bar, the lower or inner end of the opening or chamber of the housing having an asbestos packing *d*, which embraces the electrode and insulates the same from the frame or casting B. The opposite end of the electrode is provided with an asbestos sleeve or packing *d'*, over which is placed a thimble D, that enters the end of the housing, said thimble being held in place by a nut D', which engages said housing, as shown. This construction and arrangement properly insulates the stationary electrode, and it will be noted that the lower or inner end projects into the space *a* of the cylinder, while the outer end projects beyond the nut D' and is provided with a transverse hole and set-screw for connecting one of the wires from the battery thereto.

C' designates the working electrode, consisting of a metal bar, preferably steel, which has a bearing in the housing *b*<sup>2</sup>, as well as in a thimble E and nut E', connected to the outer end of said housing. The inner end of this electrode or bar C' is bent at right angles with the body portion, and the terminal is beveled to present an inclined surface, which contacts normally with one side of the inner



end portion of the stationary electrode C, the outer end of the working electrode having a hole and set-screw for connecting thereto the other wire from the battery. This electrode  
 5 is held against longitudinal movement in its bearings by means of a collar *c*, which bears against the inner side of the casting B, and a collar *c'*, which engages the nut E', the collar *c'* having a set-screw *g* and projecting handle  
 10 G to provide for operating the electrode manually, as hereinafter explained. A helical spring H is connected to the handle G and engine to hold or bring the electrodes normally in contact.

15 To the end of the piston A<sup>2</sup> adjoining the cylinder-head A' is adjustably secured an arm F, which projects therefrom a sufficient distance to engage the bent end of the working electrode C' and move the same out of  
 20 contact with the stationary electrode when said piston reaches the limit of its movement toward the head A'. This arm is attached to the piston by engaging a threaded aperture therein and is held in proper adjustment by  
 25 a set-nut *f*. With the electrodes arranged as shown in Fig. 1 the outer end of the arm F is beveled to provide an inclined surface which bears against the bent end of the work-  
 30 ing electrode and shifts the same to one side or out of contact with the stationary electrode, whereas when the electrodes are arranged as shown in Figs. 5 and 6 the end of  
 35 said arm F engages the working electrode in such manner as to push the bent end thereof away from the stationary electrode.

The mechanism for introducing gas into the cylinder may be of any approved construction, as my invention relates only to the ig-  
 40 niting of the same in the cylinder by devices which produce an electric spark, said devices being controlled automatically by the piston and manually by the lever G.

When it is desired to start the engine, a sufficient quantity of gas is admitted into the  
 45 cylinder and the lever is then thrown or operated to move the working electrode out of contact with the stationary electrode, which causes a spark that ignites the gas, exploding the same to move the piston, and as said pis-  
 50 ton is returned by the momentum of the fly-wheel the arm F will act to separate the electrodes, in the meantime the lever having been released to permit the spring H to bring  
 55 the working electrode in contact with the stationary electrode and complete the circuit from the battery. Thus the circuit is broken and a spark produced at each reciprocation  
 60 of the piston by reason of the arm F working the electrode C' against the action of the spring H.

It will be noted that by reason of the beveled or inclined surface of the working elec-  
 65 trode said electrode wedges against the stationary electrode and always keeps the contact-points clean and bright, thereby insuring a proper electric contact when the parts are  
 together. It will also be noted that the han-

dle enables the operator to know at all times whether the igniter is working properly and to start the engine with ease and certainty. 70  
 The construction is simple and compact, and the arrangement permits the parts to be readily taken apart for examination or adjustment.

One of the wires from the battery is provided with an ordinary switch to break the circuit when the engine is not in use. 75

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is— 80

1. An electric igniter for explosive-engines consisting of a stationary electrode C and a working electrode C' supported parallel with each other in a suitable frame and insulated substantially as shown, the working  
 85 electrode comprising a rock-bar the inner end of which is bent at an angle to contact with one side of the stationary electrode, and a handle G secured to the outer end of said working electrode; together with a spring for  
 90 holding the electrodes normally in contact with each other, and an arm projecting from the piston of the engine to engage the bent end of the working electrode and move the same  
 95 against the action of the spring at each reciprocation of said piston, for the purpose set forth.

2. In combination with an explosive-engine, of the stationary electrode C having an end projecting within the cylinder, a working  
 100 electrode C' comprising a rock-bar one end of which projects within the cylinder and is bent at an angle to contact with one side of the inner end of the stationary electrode, a handle  
 105 mounted on the outer end of the working electrode or rock-bar, and a spring connected to said handle and to a stationary part of the engine for holding the electrodes normally in  
 110 contact with each other, substantially as shown; together with an arm secured to the piston of the engine and adapted to strike the bent end of the working electrode or rock-  
 115 bar C' and move the same away from the stationary electrode at each reciprocation of said piston, for the purpose set forth.

3. In combination with an explosive-engine, of the stationary electrode C projecting within the cylinder, a working electrode comprising a rock-bar C' the inner end of which  
 120 is bent at an angle and the terminal beveled presenting an inclined surface which contacts with one side of the stationary electrode, a handle G mounted on the outer end of the  
 125 working electrode, and a spring H connected to the handle and to a stationary part of the engine for holding the electrodes normally in contact with each other; together with an arm  
 130 projecting from the piston of the engine and adapted to strike the bent end of the working electrode or rock-bar and operate the same against the action of the spring at each reciprocation of said piston, for the purpose set forth.

4. The combination with an explosive-en-



gine having a cylinder-head with an opening therein, a frame or casting B secured over said opening and presenting projections or housings  $b'$  and  $b''$ , an insulated stationary electrode C mounted within the housing  $b'$  to project within the cylinder of the engine, a working electrode C' comprising a rock-bar bearing in the other housing and presenting an end which projects within the cylinder and is bent at an angle and provided with a beveled terminal which contacts with one side of the inner end of the stationary electrode, a handle G mounted on the outer end of the working electrode or rock-bar, and a spring H con-

nected to said handle and to a stationary part of the engine to hold the electrodes normally in contact with each other; together with an arm projecting from the piston of the engine to operate the working electrode against the action of the spring at each reciprocation of said piston, substantially as shown and for the purpose set forth. 15 20

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. DAVIS.

Witnesses:

THOMAS EASENDEN, Jr.,  
F. E. MANNING.